WATER RESOURCES REVIEW for

MARCH

1975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

STREAMFLOW AND GROUND-WATER CONDITIONS

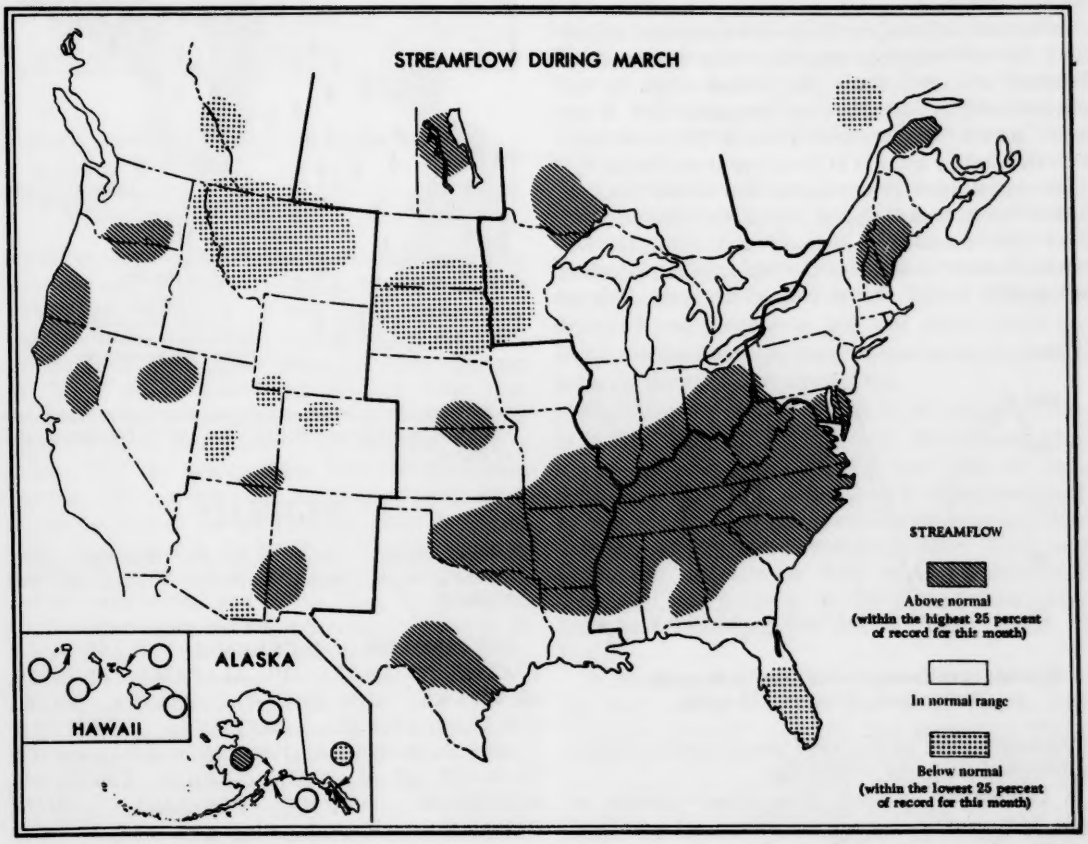
Streamflow increased seasonally in much of the United States. However, it decreased in parts of several eastern, southern, and northwestern States, and southern Canada other than the Atlantic Provinces and Vancouver Island.

Above-normal flows persisted in parts of Manitoba, Ontario, and Quebec in Canada, in many eastern and southern States, and in parts of Alaska, California, Nevada, and Oregon.

Flows remained below the normal range in parts of Quebec, Florida, and several central and western States.

Flooding occurred in all States except Florida in the Southeast region, in Illinois, Indiana, and Wisconsin in the Western Great Lakes region, and in Arkansas, Iowa, and Louisiana in the Midcontinent region. Some of the most severe flooding occurred on tributaries of the Mississippi River and at monthend, stages along the lower reaches of that stream were above flood stage and rising. The National Weather Service prediction of flooding from snowmelt runoff in the upper Mississippi River basin continued in effect at monthend.

The combined flow of the Columbia, Mississippi, and St. Lawrence Rivers, representing runoff during the month from 1.7 million square miles in the two countries, increased seasonally and was about 50 percent greater than normal.



CONTENTS OF THIS ISSUE: Northeast, Southeast, Western Great Lakes region, Midcontinent, West, Alaska; Index stations and selected large-river stream-gaging stations in the Midcontinent region; Usable contents of selected reservoirs near end of March 1975; Hawaii; New basic data reports on quality of surface water; Flow of large rivers during March 1975; Summary appraisal of the Nation's ground-water resources--Ohio Region.

NORTHEAST

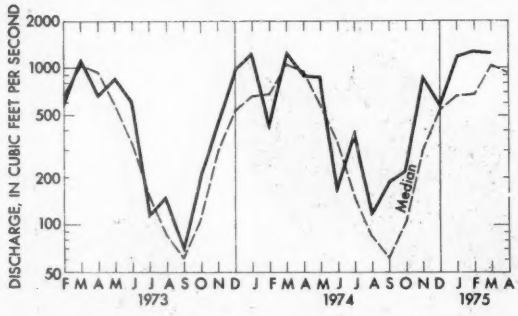
[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

STREAMFLOW GENERALLY INCREASED SEASONALLY THROUGHOUT THE REGION EXCEPT IN PARTS OF QUEBEC, WHERE THE SEASONAL DECLINE CONTINUED, AND IN PENNSYLVANIA, WHERE FLOWS DECREASED SLIGHTLY FROM THE ABOVE-NORMAL MEAN DISCHARGES OF FEBRUARY. MONTHLY MEAN FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN SOUTHEASTERN QUEBEC AND INCREASED INTO THAT RANGE IN PARTS OF THE NEW ENGLAND STATES, MARYLAND, AND DELAWARE.

In Matane River basin in the Gaspe peninsular part of southeastern Quebec, monthly mean flow near Matane increased seasonally and remained in the above-normal range for the 4th consecutive month. By contrast, flow of Outardes River at Outardes Falls, also in southeastern Quebec but north of St. Lawrence River, decreased seasonally for the 5th consecutive month and was in the below-normal range.

In central and southern Maine flows increased sharply from the below-median monthly mean discharges of February and were above the normal range. In the adjacent area of northern New Hampshire flow at the index station, Pemigewasset River at Plymouth also increased sharply and was in the above-normal range.

In northwestern Pennsylvania, flow of Oil Creek at Rouseville decreased slightly, from the above-normal flows that persisted in January and February, but remained above median for the 9th consecutive month (see graph). In the central part of the State, flow of



Monthly mean discharge of Oil Creek at Rouseville, Pa. (Drainage area, 300 sq mi; 777 sq km)

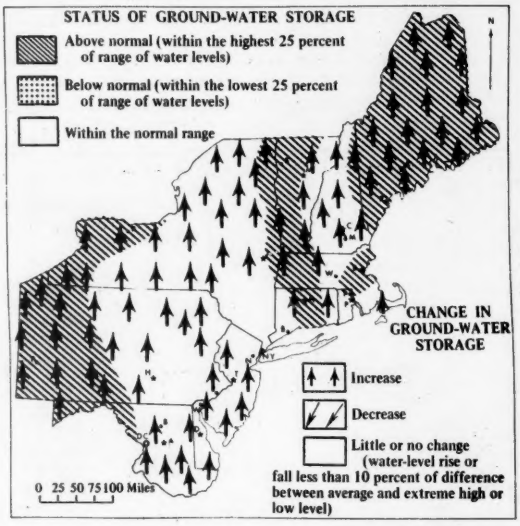
Susquehanna River at Harrisburg also decreased slightly but remained above the median flow.

In Connecticut, monthly mean flows decreased at some index stations, increased at others, and were near or slightly above median discharges for the month.

In New York and New Jersey, flows generally increased seasonally and were near or slightly greater than median.

In the southern part of the region, monthly mean discharge of Seneca Creek at Dawsonville, in central Maryland, increased into the above-normal range and remained above median for the 4th consecutive month. In eastern Maryland, and in Delaware, flows also were above the normal range. On Choptank River near Greensboro (drainage area, 113 square miles) in eastern Maryland, the monthly mean discharge of 537 cfs and the daily mean of 2,000 cfs on the 26th, were highest for the month since records began in January 1948.

Ground-water levels rose seasonally in most of the region (see map). Monthend levels were above average in many parts of New England, especially in the north, and were above average also in western New York, Pennsylvania, and Maryland. Elsewhere in the region, monthend levels were near average for early spring.


STATUS OF GROUND-WATER STORAGE
Above normal (within the highest 25 percent of range of water levels)
Below normal (within the lowest 25 percent of range of water levels)
Within the normal range
N
CHANGE IN GROUND-WATER STORAGE
Increase
Decrease
Little or no change (water-level rise or fall less than 10 percent of difference between average and extreme high or low level)
0 25 50 75 100 Miles

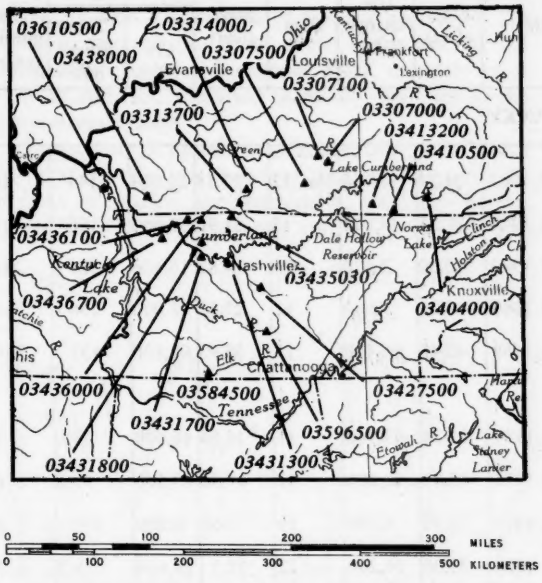
Map above shows ground-water storage near end of March and change in ground-water storage from end of February to end of March.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW INCREASED SEASONALLY EXCEPT IN PARTS OF ALABAMA, FLORIDA, KENTUCKY, AND SOUTH CAROLINA, WHERE CONTRASEASONAL DECLINES OCCURRED. FLOWS REMAINED ABOVE THE NORMAL RANGE IN PARTS OF ALABAMA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, SOUTH CAROLINA, AND VIRGINIA, AND BELOW THAT RANGE IN PARTS OF FLORIDA. FLOODING OCCURRED IN EACH STATE IN THE REGION EXCEPT FLORIDA.

Severe flooding occurred in parts of Kentucky and Tennessee, March 12 to 15. Peak discharges at many gaging stations in those States were greater than the discharge of a 100-year flood. Selected data on stages, discharges, and gaging-station locations are given on the accompanying table and map. Two flood-associated



Locations of stream-gaging stations in Kentucky and Tennessee, described in table of peak stages and discharges.

deaths were reported in Tennessee and damages in that State were estimated to be as high as $60 million. Also in Tennessee, the March 13 daily mean discharges of 101,000 cfs and 41,000 cfs, respectively, at the index stations, Duck River above Hurricane Mills (drainage area, 2,557 square miles), and Harpeth River near Kingston Springs (drainage area, 681 square miles), were highest for March since records began at those two sites in July 1925. In Emory River basin in east-central Tennessee, the monthly mean discharge of 8,982 cfs at the index station at Oakdale (drainage area, 764 square miles) was the greatest for March in 48 years of record. In Kentucky, the most severe flooding occurred in the extreme south-central part of the State, in the Barren and Red River basins, but major flooding occurred on all streams along the Kentucky-Tennessee State boundary from Williamsburg, Ky., west to the Mississippi River.

In western North Carolina, rapid runoff from rains of 6 to 7 inches March 14, 15, caused extreme flooding in Polk, Rutherford, Cleveland, and Iredell counties. Peak discharges ranged from that of a 20-year flood on Second Broad River at Cliffside, to that of a 40-year flood on South Yadkin River near Mocksville. At least 6 major, and many secondary, roads in the four-county area were closed as a result of washouts around bridges, and landslides. Lesser amounts of rain March 19 and 24 caused some minor flooding on tributary streams in the same area. At the index station, South Yadkin River near Mocksville (drainage area, 313 square miles) the monthly mean discharge of 1,480 cfs, and the daily mean of 9,500 cfs on March 15, were highest for the month since records began in October 1938. This monthly mean discharge also was the highest for any month in the period of record.

In South Carolina, runoff from intense rains March 11 to 13 resulted in moderate flooding in the headwaters areas of Pee Dee and Santee Rivers. Peak discharges generally were equal to those of 5- to 10-year floods.

In northeastern Mississippi, moderate flooding occurred along Tombigbee River at midmonth. Peak discharges at gaging stations near Fulton and at Columbus were equivalent to those of 12- and 16-year floods, respectively. Peak stages were appreciably lower than maximums of record. In the north-central part of the State, where rainfall amounts and intensities were greater than in Tombigbee River basin, the peak discharge of 19,000 cfs on Yockanookany River near Kosciusko (drainage area, 314 square miles), tributary to Pearl River, was equal to that of a 40-year flood. Monthly mean flows at index stations in northern Mississippi were above the normal range and more than twice as great as the monthly medians. On the west-central boundary of the State, Mississippi River at Vicksburg was about 3 feet above flood stage and rising at monthend.

In west-central Alabama, some flooding occurred along Tombigbee River in the Cochran area, and in the northern part of that State, flooding occurred in Tennessee River basin. In southeastern Alabama, monthly mean flow of Conecuh River at Brantley decreased contraseasonally but was almost twice the March median discharge and remained above the normal range for the 4th consecutive month.

Flash flooding occurred March 13 on Peachtree Creek in Atlanta, Georgia (drainage area, 86.8 square miles) where the peak stage of 19.4 feet, and the peak discharge of 8,400 cfs, were highest in record that began in June 1958. Also in northern Georgia, monthly mean discharge at the index stations, Oconee River near Greensboro and Etowah River at Canton, increased seasonally and remained in the above-normal range. Flow near Greensboro was almost 3 times median for March.

In Virginia, moderate flooding occurred throughout the State during the latter part of the month. Peak discharges generally were less than those of a 10-year flood. Monthly and maximum daily mean discharges were highest of record at several index stations. For example, the maximum daily discharge of 7,715 cfs, March 14, at North Fork Holston River near Saltville (drainage area, 222 square miles), in southwestern Virginia, was highest for March in 56 years of record; on Nottaway River near Stony Creek (drainage area, 579

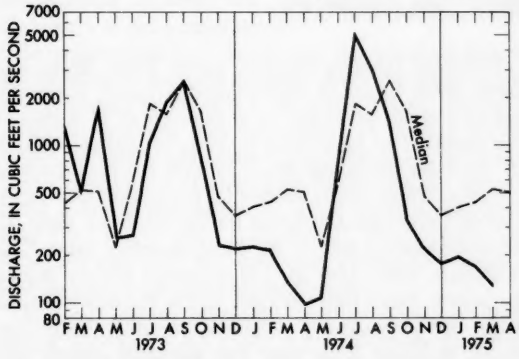
STAGES AND DISCHARGES FOR THE FLOODS OF MARCH 1975 AT SELECTED SITES IN KENTUCKY AND TENNESSEE

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
KENTUCKY											
GREEN RIVER BASIN											
03307000	Russell Creek near Columbia.	188	1939–	Feb. 27, 1962	24.34	16,700	Mar. 12	23.55	28,000	149	>100
03307100	Russell Creek near Gresham.	265	1964–	Jan. 11, 1974	[a]26.34	14,000	13	31.90	52,000	196	>100
03307500	South Fork Little Barren River at Edmonton.	18.3	1941–	June 15, 1949	10.00	2,970	12	14.82	10,500	574	>100
03313700	West Fork Drakes Creek near Franklin.	110	1968–	June 23, 1969	17.33	9,930	12	23.22	26,000	236	>100
03314000	Drakes Creek near Alvaton.	478	1939–	June 23, 1969	40.43	96,400	12	35.93	62,500	131	>100
CUMBERLAND RIVER BASIN											
03404000	Cumberland River at Williamsburg.	1,607	1950–	Jan. 31, 1957	33.78	49,700	15	[b]34.54	46,600	29.0	25
03410500	South Fork Cumberland River near Stearns.	954	1942–	May 28, 1973	45.31	93,200	13	44.30	89,500	93.8	60
03413200	Beaver Creek near Monticello.	43.4	1968–	Apr. 4, 1974	[c]6.53	4,380	13	7.60	6,500	150	50
03438000	Little River near Cadiz . . .	244	1940–	Jan. 14, 1951	21.00	14,200	12	22.3	19,400	79.5	70
TENNESSEE RIVER BASIN											
03610500	Clarks River near Benton . .	227	1938–	Nov. 19, 1957	[d]17.10	36,000	13	16.73	30,400	134	30
TENNESSEE											
CUMBERLAND RIVER BASIN											
03427500	East Fork Stones River near Lascassas.	262	1950–58, 1963–	May 27, 1973	34.83	23,100	13	[e]39.48	39,000	149	>100
03431300	Browns Creek at State Fairgrounds, at Nashville.	11.8	1963–	June 13, 1973	6.70	1,490	12	7.51	1,400	119	>100
03431700	Richland Creek at Charlotte Avenue, at Nashville.	24.3	1964–	Apr. 8, 1965	10.63	5,580	12	11.38	5,000	206	>100
03431800	Sycamore Creek near Ashland City.	97.2	1961–	Feb. 27, 1962	11.52	11,200	12	13.20	17,000	175	>100
03435030	Red River near Portland . .	15.1	1966–	June 23, 1969	12.38	4,460	12	12.94	5,130	340	>100
03436000	Sulphur Fork Red River near Adams.	186	1938–	Feb. 27, 1962	23.2	13,700	12	30.86	36,000	194	>100
03436100	Red River at Port Royal.	935	1961–	Feb. 27, 1962	43.18	43,500	13	[f]48.26	60,000	64.2	>100
03436700	Yellow Creek near Shiloh.	124	1957–	Feb. 27, 1962	14.4	8,190	13	15.19	10,000	80.6	40
TENNESSEE RIVER BASIN											
03584500	Elk River near Prospect . .	1,784	1904–08, 1919–	Mar. 17, 1973	40.12	117,000	14	36.91	83,000	46.5	50
03596500	Duck River at Normandy.	208	1920–31, 1970–	Mar. 23, 1929	21.1	60,000	13	19.0	36,300	175	60

[a] Flood of Mar. 27, 1962, reached a stage of about 32 feet.
[b] Maximum stage known since at least 1918.
[c] Flood in 1946 reached a stage of 10.8 feet
[d] Flood in February 1937 reached a stage of 17.8 feet.
[e] Maximum stage since at least 1902.
[f] Maximum stage since at least 1913.

square miles), in southeastern Virginia, the monthly mean of 2,240 cfs, and the maximum daily of 6,840 cfs on the 18th, were highest for the month in 46 years of record; and on Slate River near Arvonia (drainage area, 226 square miles), in the central part of the State, the monthly mean of 972 cfs, and daily mean of 6,380 cfs on the 20th, were greatest for the month in 49 years of record. In West Virginia, minor flooding occurred in the southern part of the State about midmonth. In the southeastern basin of Greenbrier River, monthly mean flow at Alderson increased seasonally and was in the above-normal range.

In west-central Florida, monthly mean flow of Peace River at Arcadia continued to decrease, was only 24 percent of median, and remained in the below-normal range for the 7th consecutive month (see graph). The



Monthly mean discharge of Peace River at Arcadia, Fla. (Drainage area, 1,367 sq mi; 3,541 sq km)

mean discharge of 128 cfs was appreciably greater than the March minimum monthly discharge of 92.4 cfs that occurred in 1935. In the southeastern part of the State, flow of Miami Canal at Miami decreased to 0.14 cfs; 0.1 percent of normal, and in southwestern Florida, flow in Tamiami Canal outlets, 40-mile bend to Monroe, decreased to 0 cfs. In northern Florida, monthly mean flow of Suwannee River at Branford decreased contraseasonally, from the above-normal mean flow of February, but was greater than median and in the normal range. Also in the northern part of the State, flow of Silver Springs decreased 40 cfs, to 690 cfs; 91 percent of normal.

Ground-water levels rose in most of the region but declined in parts of northern and southeastern Florida. In the Jackson area of central Mississippi, there was little or no change in levels in wells tapping the Sparta Sand. Monthend levels were above average in much of the Southeast region, including Kentucky, North Carolina, and most of West Virginia (other than the east-central part of that State). Levels in wells were unusually high in some areas because of recharge from heavy rains. In the Ohio River valley at Louisville, Kentucky, the level in the observation well (tapping glacial outwash deposits of sand and gravel) continued to rise, reaching its highest point of the past 30 years. In northern and central Florida, levels were below average—lowest of record for end of March in Pensacola in the northwest, in Jacksonville in the northeast, and in Mulberry (Polk County) in the central part of the State. In southeastern Florida, levels ranged from slightly above average along the coastal ridge to 2.5 feet below average in inland areas.

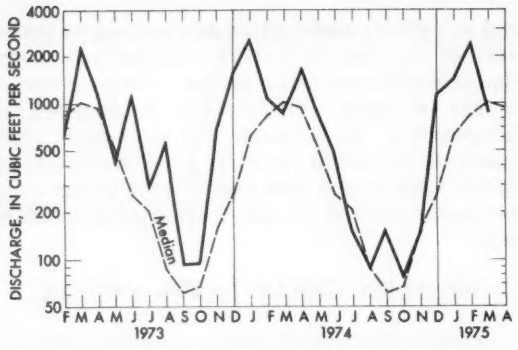
WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

STREAMFLOW GENERALLY INCREASED SEASONALLY IN THE SOUTHERN AND CENTRAL PARTS OF THE REGION BUT DECREASED SEASONALLY IN PARTS OF ONTARIO. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN PARTS OF ONTARIO, OHIO, INDIANA, AND ILLINOIS, BUT WERE BELOW THE NORMAL RANGE IN MINNESOTA. FLOODING OCCURRED IN PARTS OF ILLINOIS, INDIANA, AND WISCONSIN.

Extensive flooding occurred near monthend in Rock River basin in the southern part of Wisconsin and the adjacent part of northern Illinois as a result of snowmelt runoff, augmented by rains. The peak discharge of about 30,000 cfs, March 26, on Rock River at Rockton, Illinois (drainage area, 6,361 square miles) was 2d highest in 43 years of record and roughly equal to that of a 25-year flood. Some flooding occurred also along Pecatonica River, tributary to Rock River near Rockton, and monthly mean discharge, as measured at Freeport, Illinois, increased sharply from the below-median discharge of February, and was above the normal range. In southeastern Wisconsin, flooding occurred in Milwaukee River basin, also near monthend, as a result of runoff from intense, localized rains, augmented by snowmelt. Peak discharges generally were less than those of a 15-year flood. Lowland flooding occurred in southern Indiana during the last half of the month as a result of runoff from several rains. The greatest amount of precipitation fell in East Fork White River basin where monthly mean discharge at the index station at Shoals increased sharply from the above-normal flow of February and was about twice the median flow for March. By contrast, in northern Indiana, monthly mean discharge of Mississinewa River at Marion decreased sharply, from the above-normal flow of February, and was less than the monthly median for the 1st time in 4 months (see graph on page 6).

In Ohio, monthly mean discharge at index stations in the eastern and central parts of the State decreased contraseasonally, from the above-normal flows of February, but remained above the normal range. Monthly mean flow of Scioto River at Higby, in the central part of the State, has been in the above-normal range for 7



Monthly mean discharge of Mississinewa River at Marion, Ind. (Drainage area, 682 sq mi; 1,766 sq km)

consecutive months and cumulative runoff since the beginning of the 1975 water year has been more than twice the median cumulative runoff for the 6-month period.

Monthly mean flows were in the normal range at all index stations in Michigan and were slightly less than median in the Upper Peninsula and in the northern part of the Lower Peninsula. A considerable amount of snow remained on the ground at monthend in the latter two areas.

In Minnesota, the usual sharp increases in streamflow that result from March snowmelt runoff did not occur this year because of below-normal daily-maximum temperatures and lack of frost in the ground. The snow that melted did not produce runoff. Mean flows in Buffalo, Crow, and Minnesota Rivers, in western, central, and southern parts of the State, respectively, were about one-third of median for the month and in the below-normal range. Monthend snowpack in the Mississippi River headwaters area, in north-central Minnesota, remained about the same as at end of February and the National Weather Service reports that a spring flood threat continues along that stream in the State.

In southwestern Ontario, monthly mean flow of English River at Umfreville continued to decrease seasonally but remained in the above-normal range for the 10th consecutive month. In the southeastern part of the Province, flows increased seasonally and were near normal for March. In the east-central part, flow of Missinaibi River at Mattice decreased seasonally and was less than median for the first month since April 1974.

Ground-water levels generally rose in Illinois, Indiana, and southern parts of Michigan and Wisconsin; and declined in Minnesota and in northern Wisconsin and Michigan. Monthend levels were below average in Minnesota; and near or above average in Michigan and Wisconsin. In eastern Ohio, monthend level in the water-table observation well at Strasburg (Tuscarawas County) was highest for end of March in the 30 years of record. In the heavily pumped Minneapolis-St. Paul, Minn., area, artesian levels rose slightly in wells tapping the Prairie du Chien-Jordan aquifer and continued to rise sharply in the deeper Mt. Simon-Hinckley aquifer; levels were below average in both aquifers.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

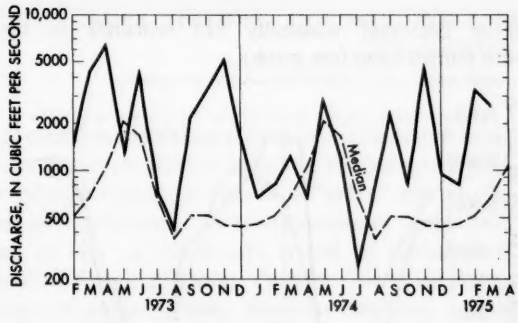
STREAMFLOW GENERALLY INCREASED SEASONALLY THROUGHOUT THE REGION, EXCEPT IN OKLAHOMA AND TEXAS, AND REMAINED ABOVE THE NORMAL RANGE IN PARTS OF MANITOBA, MISSOURI, OKLAHOMA, LOUISIANA, AND TEXAS. FLOWS REMAINED BELOW THE NORMAL RANGE IN EASTERN SOUTH DAKOTA. FLOODING OCCURRED IN PARTS OF ARKANSAS, IOWA, AND LOUISIANA.

Extensive flooding occurred in the White, Black, and Cache River basins in northeastern Arkansas at monthend as a result of runoff from as much as 14 inches of rain reported to have fallen in parts of that area March 28, 29. Peak discharges generally were less than those of a 10-year flood. Some residential evacuation was necessary on flood plains in urban areas along White River. In the north-central part of the State, monthly mean flow of Buffalo River near St. Joe increased sharply during the month, was 3 times median, and in the above-normal range. In southeastern Arkansas, monthly mean discharge of Saline River near Rye increased slightly and was in the above-normal range. Cumulative runoff at that site during the first half of the 1975 water year was about twice the cumulative median runoff for the period.

In southeastern Louisiana, the lower reaches of Pearl River remained above flood stage during most of the month but no unusual damage was reported. In the south-central part of the State, monthly runoff of Red River at Alexandria was 2d highest for the month since records began in 1929. In northern Louisiana, monthly mean discharge of Saline Bayou near Lucky remained above the normal range for the 7th consecutive month, and in adjacent Oklahoma, monthly mean flow of Washita River near Durwood, in the southern part of the State, remained in the above-normal range for the 3d consecutive month (see graph on page 7).

In south-central Nebraska and the adjacent area of north-central Kansas, monthly mean flow of Little Blue River, as measured near Barnes, Kansas, increased sharply as a result of runoff from rapid melting of heavy snow cover near midmonth. Elsewhere in Nebraska, flows generally were less than median, and in other parts of Kansas, streamflow was above normal.

In Iowa, snowmelt runoff during the last half of the month increased stages on most streams to near

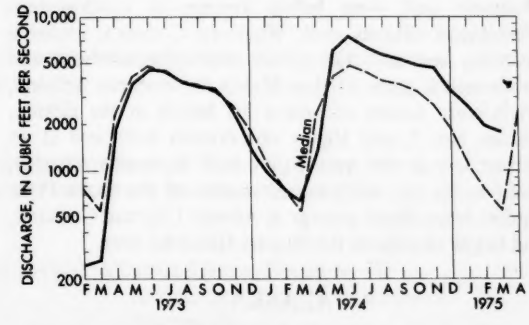


Monthly mean discharge of Washita River near Durwood, Okla. (Drainage area, 7,202 sq mi; 18,653 sq km)

bankfull. Some minor flooding resulted from small ice jams. Monthly mean flows at index stations in the north-central, eastern, and southwestern parts of the State were in the normal range.

In eastern South Dakota, and the adjacent area of northwestern Iowa, the monthly mean discharge of Big Sioux River, as measured at Akron, Iowa, increased seasonally but was only 18 percent of median for the month and remained below the normal range. In central South Dakota and southwestern North Dakota, monthly mean flows at the respective index stations, Bad River near Fort Pierre and Cannonball River at Breien, also increased seasonally but were only 14 and 13 percent of median and in the below-normal range.

In south-central Manitoba, flow of Waterhen River below Waterhen Lake continued to decrease seasonally but was 3 times the median flow for March and remained in the above-normal range for the 11th consecutive month (see graph). The level of Lake



Monthly mean discharge of Waterhen River below Waterhen Lake, Manitoba (Drainage area, 22,000 sq mi; 56,980 sq km)

Winnipeg at Gimli averaged 716.26 feet above mean sea level, which is the highest of record for March, 0.35 foot higher than the previous maximum mean for the month (1970), 3.34 feet higher than the March long-term mean, and 0.08 foot higher than last month.

Ground-water levels changed only slightly in much of the region but generally rose in Nebraska (except in northeastern and north-central parts) and in Iowa. Monthend levels were below average in North Dakota; were near average in Nebraska (except in heavily pumped areas); and above average in Iowa. In the rice-growing Grand Prairie area of east-central Arkansas, levels continued to rise in the deep aquifer but remained below average. In the industrial aquifer (Sparta Sand) in the central and southern part of the State, levels rose both at Pine Bluff and El Dorado. In Louisiana, levels declined in most of the major aquifers; falling levels in the Chicot aquifer in the southwest reflected the beginning of pumping for the 1975 irrigation season. In Texas, levels rose at Austin (Edwards Limestone) and Houston (Evangeline aquifer); and fell at San Antonio (Edwards Limestone) and El Paso (bolson deposits). Monthend levels were above average at Austin and San Antonio; and below average at Houston (new monthly low for March) and El Paso (alltime low level).

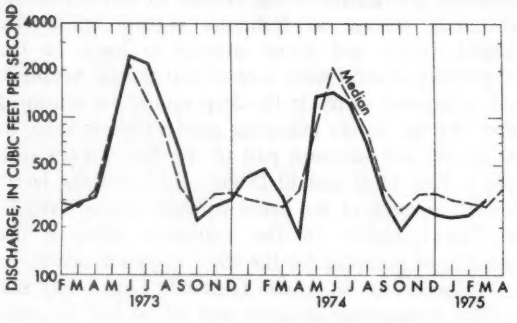
WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

STREAMFLOW GENERALLY INCREASED SEASONALLY IN THE SOUTHERN STATES OF THE REGION, BUT IN THE NORTH INCREASED AT SOME INDEX STATIONS AND DECREASED AT OTHERS. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN PARTS OF CALIFORNIA, NEVADA, AND WASHINGTON, AND IN THE BELOW-NORMAL RANGE IN PARTS OF ARIZONA, COLORADO, MONTANA, AND UTAH.

In Gila River basin, in southwestern New Mexico and the adjacent area of southeastern Arizona, monthly mean flows increased seasonally. Flows of Gila River near Gila, New Mexico, and at head of Safford Valley, near Solomon, Arizona, were nearly twice the respective median flows for March and were above the normal range. In the extreme southern part of Arizona, flow of San Pedro River at Charleston decreased seasonally and remained below the normal range for the 4th consecutive month. In northeastern Arizona, flow occurred at the index station, Little Colorado River near Cameron during the period March 4–31 (no flow, March 1–3), but monthly mean discharge was only 57 percent of median flow for March.

In south-central Colorado, east of the Continental Divide, monthly mean flow of Arkansas River at Canon City increased contraseasonally and was greater than median for the first month since May 1974 (see graph on page 8). In the northern part of the State, west of the Continental Divide, monthly mean discharge of Yampa River at Steamboat Springs remained essentially the same as in February but was below the normal range. March flow usually is appreciably greater than that of February at this index station.



Monthly mean discharge of Arkansas River at Canon City, Colo. (Drainage area, 3,117 sq mi; 8,073 sq km)

In southeastern Utah, monthly mean flow of San Juan River near Bluff increased sharply, was more than twice the median flow for March and in the above-normal range. In the southwestern and northeastern parts of the State, monthly mean discharges of Beaver River near Beaver and Whiterocks River near Whiterocks, respectively, increased seasonally but were below the normal range. Also in northern Utah, the level of Great Salt Lake rose 0.50 foot during the month (to 4,200.40 feet above mean sea level), 0.30 foot lower than a year ago and 1.80 feet higher than the average (1940–70) level for March.

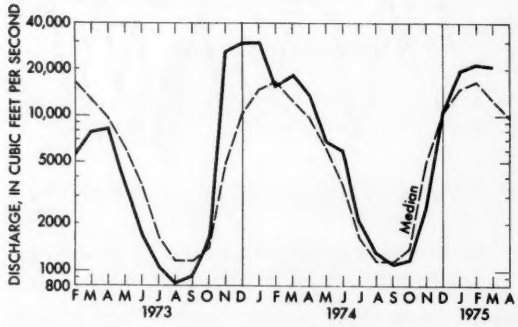
In northeastern Nevada, flow of Humboldt River at Palisade continued to increase seasonally and monthly mean discharge remained in the above-normal range.

In south-central Montana, monthly mean flows at index stations in Yellowstone River basin increased seasonally and remained above median, but elsewhere in the State, flows in Marias, Clark Fork, and Middle Fork Flathead River basins remained in the below-normal range.

In northern California, the monthly mean discharge of 13,090 cfs in the coastal basin of Smith River, near Crescent City (drainage area, 609 square miles) was the 3d largest for March since records began in 1931, exceeded only by the monthly means of 1938 and 1972. The maximum daily discharge of 78,400 cfs on the 18th was the 2d highest daily mean for March, exceeded only by the maximum daily of March 1972. Also in the northern part of the State, the monthly mean discharge of North Fork American River at North Fork Dam increased contraseasonally and was above the normal range.

In Idaho, monthly mean flows at all index stations were in the normal range. Flows in the Kootenai, Salmon, and Coeur d'Alene Rivers were less than their respective medians, but flows in the Snake, Clearwater, and Weiser Rivers were greater than the median flows for March. Snowpacks increased during the month and at monthend were normal to well above normal.

In the coastal basin of Umpqua River, in southwestern Oregon, monthly mean flow at the index station near Elkton decreased seasonally but remained in the above-normal range (see graph).



Monthly mean discharge of Umpqua River near Elkton, Oreg. (Drainage area, 3,683 sq mi; 9,539 sq km)

Storage near monthend in major reservoirs in the region generally was above average but less than a year ago. Net increase in storage in the Colorado River Storage Project was 123,400 acre-feet during the month.

Ground-water levels generally rose in Washington and Nevada (except in the heavily pumped Las Vegas and Truckee Meadows areas); rose or changed only slightly in southern California; changed only slightly or declined in Idaho and southern New Mexico; and declined in Montana and Utah (except for a rise in the key well at Flowell, Millard County, in central Utah). Monthend levels were above average in eastern Washington (Spokane and Cashmere wells), northern Idaho (Rathdrum Prairie well), and in Nevada (except Las Vegas and Truckee Meadows); were near average in Montana; and were below average in northwestern Washington (Sumas well, Whatcom County), southern Arizona, and in Utah (other than the northern and southeastern parts of that State). In southern Arizona, levels were lowest of record for March in the Elfrida, Tucson No. 2, and Higley observation wells and at an alltime low in the Avra Valley well. In southern Idaho, levels in the key wells representative of the Snake Plain aquifer were above average at Atomic City and Gooding, and below average in the Rupert-Minidoka area.

ALASKA

Streamflow continued to decrease seasonally in all parts of the State. Flow of Gold Creek near Juneau, in southeastern Alaska, decreased sharply as a result of below-normal precipitation in that basin, and monthly mean discharge was below the normal range. In the south-central part of the State, flow of Little Susitna River near Palmer also decreased but remained in the above-normal range, and in south-coastal Alaska, flow of Kenai River at Cooper Landing remained in the normal range. Monthly mean discharges at these two index stations have been greater than median for 5 consecutive

(Continued on page 13.)

INDEX STATIONS AND SELECTED LARGE-RIVER STREAM-GAGING STATIONS IN THE MIDCONTINENT REGION

(Manitoba and Saskatchewan; Ark., Iowa, Kans., La., Mo., Nebr., N. Dak., Okla., S. Dak., and Tex.)

Streamflow conditions as described each month in the Water Resources Review, including the front-page map, are based primarily on data from "index" and selected large-river stations—stream-measurement sites with long periods of record and typical of surface-water conditions in a particular Province, State, or region. Flows at index stations represent relatively natural conditions; that is, generally free of man-made controls or effects such as upstream dams and diversions. Flows at large-river stations may be affected markedly by upstream reservoir controls (storage or releases) and/or upstream diversions such as for irrigation. Stations selected for the "large-river" category have either large drainage areas or large flows, usually both. Drainage areas of some of the large rivers, such as the Mississippi River at Keokuk, Iowa, and those rivers that drain eastward from the Continental Divide, include areas in regions other than just the Midcontinent region.

In the Midcontinent region there are 22 index stations and 6 large-river stations, including 2 stations that represent both categories. The location and means and extremes of flow at these 26 stations are shown on the accompanying map and table.

Seasonally highest flows normally occur in the spring, a time of substantial meltwater runoff from snows and runoff from spring rains. Peak flows of record on two-thirds of the streams listed in the table occurred in April, May, or June. Highest flows of the other 8 streams were spread throughout the year, having occurred in 7 of the remaining 9 months: January–March, July, September, October, and December. Seasonally lowest flows occur predominantly in August, September, or October, a time when snowmelt runoff is zero or minimal and rates of evapotranspiration are high so that much of the rainfall never reaches the streams. The lowest flows of record at 19 of the 26 stations occurred in the August-to-October period and at the other 9 stations the lowest flows were during the winter months.

In some instances, peak stages or discharges greater than those in the accompanying table have been determined for floods that occurred prior to the period of record listed in the table. These data are given below for 11 stations:

Station number	Station	Date or month	Discharge (cfs)
07056000	Buffalo River near St. Joe, Ark	August 1915 [Discharge not known; peak stage (50.5 feet) about 7.1 feet higher than peak stage of Dec. 10, 1971]	
05474500	Mississippi River at Keokuk, Iowa	June 6, 1851	360,000
07378500	Amite River near Denham Springs, La	Mar. 15, 1921 [Discharge not known; peak stage (35.4 feet) about 2.9 feet higher than peak stage of May 20, 1953]	
06933500	Gasconade River at Jerome, Mo	Jan. 6, 1897	120,000
06897500	Grand River near Gallatin, Mo	July 8, 1909 [Discharge not known; peak stage (about 40 feet) about 5.4 feet higher than peak stage of June 24, 1947]	
06934500	Missouri River at Hermann, Mo (Discharge computed by Corps of Engineers)	June 1844	892,000
06441500	Bad River near Fort Pierre, S. Dak	July 1905 and April 1927 [Discharges not known; peak stages about 3.3 and 1.3 feet, respectively, higher than peak stage of June 18, 1967]	
08167500	Guadalupe River near Spring Branch, Tex	1869 and July 1900 [Discharges not known; peak stages about 11 and 7 feet, respectively, higher than peak stage of July 3, 1932]	
08033500	Neches River near Rockland, Tex	May 1884	62,000
08095000	North Bosque River near Clifton, Tex	[Peak stage of Oct. 4, 1959 (34.88 feet) is maximum since at least 1854]	
08134000	North Concho River near Carlsbad, Tex	[Peak stage of Sept. 26, 1936 (29.1 feet) is maximum since 1853]	

Index and large-river stream-gaging stations, Midcontinent region, used in preparation of the Water Resources Review

Name of index (In) and large-river (LR) gaging station (listed by Provinces and States, and then alphabetically by rivers)	Station number	Drainage area, in sq mi (sq km)	Stream discharge				
			Period of record through 1972				1941–70
			Period, in years (total years of record)	Maximum, in cfs; date	Minimum, in cfs; date	Mean, in cfs (m^3/s)	Median, in cfs (m^3/s)
CANADA							
Waterhen River below Waterhen Lake, Manitoba. (In)	05LH005	22,000 (56,980)	1950– (19)	[a]11,900 June 9, 1955	0 Feb. 17, 1959	2,730 (77)	[b]2,430 (69)
UNITED STATES							
Buffalo River near St. Joe, Ark. (In)	07056000	829 (2,147)	1939– (33)	102,000 Dec. 10, 1971	6.6 Sept. 16, 17, 20, 1954	1,006 (28)	1,016 (29)
Saline River near Rye, Ark. (In)	07363500	2,062 (5,340)	1937– (35)	74,500 May 18, 1968	3.5 Sept. 27, 28, 1954	2,426 (69)	2,328 (66)
Big Sioux River at Akron, Iowa. (In)	06485500	9,030 (23,390)	1928– (44)	80,800 Apr. 9, 1969	[c]7 Feb. 26–28, 1936	858 (24)	916 (26)
Cedar River at Cedar Rapids, Iowa. (In)	05464500	6,510 (16,861)	1902– (70)	73,000 Mar. 31, 1961	[d]53 Jan. 6, 1950	3,142 (89)	3,016 (85)
Des Moines River below Raccoon River at Des Moines, Iowa. (LR)	05485500	9,879 (25,586)	1940– (32)	77,000 June 26, 1947	[c]55 Oct. 19, 1956	3,783 (107)	3,244 (92)
Mississippi River at Keokuk, Iowa. (LR)	05474500	119,000 (308,210)	1878– (94)	[a]327,000 May 1, 1965	[c]5,000 Dec. 27, 1933	61,520 (1,742)	59,795 (1,693)
Nishnabotna River above Hamburg, Iowa. (In)	06810000	2,806 (7,268)	1922–23, 1928– (45)	55,500 June 24, 1947	[c]4.5 Aug. 30, 1934	939 (27)	1,072 (30)
Little Blue River near Barnes, Kans. (In)	06884400	3,324 (8,609)	1922–25, 1928– (46)	50,400 June 10, 1941	22 Aug. 6, 1964	617 (17)	669 (19)
Saline River near Russell, Kans. (In)	06867000	1,502 (3,890)	1945–53, 1959– (21)	19,400 Sept. 1, 1964	0 Aug. 11, 12, 1964	118 (3.3)	79.3 (2.2)
Amite River near Denham Springs, La. (In)	07378500	1,280 (3,315)	1938– (34)	67,000 May 20, 1953	[c]271 Oct. 17, 18, 1956	1,824 (52)	1,836 (52)
Calcasieu River near Oberlin, La. (In)	08013500	753 (1,950)	1922–24, 1938– (36)	72,800 May 19, 1953	30 Sept. 28, 29, Oct. 17–19, 1956	1,110 (31)	974 (28)
Pearl River near Bogalusa, La. (LR)	02489500	6,630 (17,172)	1938– (34)	88,200 Feb. 23, 1961	1,020 Oct. 29–Nov. 1, 1963	8,634 (245)	8,368 (237)
Saline Bayou near Lucky, La. (In)	07352000	154 (399)	1940– (32)	13,500 Jan. 1, 1945	2.4 Aug. 14, 1954	156 (4.4)	157 (4.4)
Gasconade River at Jerome, Mo. (In)	06933500	2,840 (7,360)	1903–05, 1922– (52)	101,000 Apr. 15, 1945	254 Sept. 21–22, 1956	2,461 (70)	2,402 (68)
Grand River near Gallatin, Mo. (In)	06897500	2,250 (5,830)	1921– (51)	69,100 June 24, 1947	2.2 June 3, 4, Oct. 27–29, 1956	1,086 (31)	1,066 (30)
Missouri River at Hermann, Mo. (LR)	06934500	528,200 (1,368,000)	1897– (75)	676,000 June 6, 7, 1903	4,200 Jan. 10–12, 1940	78,370 (2,219)	79,175 (2,242)
Elkhorn River at Waterloo, Nebr. (In)	06800500	6,900 (17,900)	1899–1903, 1911–15, 1928– (52)	[e]100,000 June 12, 1944	50 Nov. 12, 1940	1,135 (32)	1,124 (32)
Cannonball River at Breien, N. Dak. (In)	06354000	4,100 (10,600)	1934– (38)	94,800 Apr. 19, 1950	[f]0	247 (7.0)	192 (5.4)
Red River of the North at Grand Forks, N. Dak. (In, LR)	05082500	30,100 (78,000)	1882– (90)	80,000 Apr. 10, 1897	[g]2.4	2,463 (70)	2,592 (73)
Washita River near Durwood, Okla. (In, LR)	07331000	7,202 (18,653)	1928– (44)	98,000 May 19, 1957	[h]0	1,344 (38)	1,148 (33)
Bad River near Fort Pierre, S. Dak. (In)	06441500	3,107 (8,047)	1928– (44)	43,800 June 18, 1967	[f]0	158 (4.5)	103 (2.9)
Guadalupe River near Spring Branch, Tex. (In)	08167500	1,315 (3,406)	1922– (50)	121,000 July 3, 1932	[i]0	268 (7.6)	240 (6.8)
Neches River near Rockland, Tex. (In)	08033500	3,636 (9,417)	1903– (69)	49,800 May 6, 1944	1.6 Sept. 28–30, Oct. 1, 2, 1956	[j]1,466 (42)	1,944 (55)
North Bosque River near Clifton, Tex. (In)	08095000	972 (2,517)	1923– (49)	92,800 Oct. 4, 1959	[f]0	[k]265 (7.5)	158 (4.5)
North Concho River near Carlsbad, Tex. (In)	08134000	1,249 (3,235)	1924– (48)	94,600 Sept. 26, 1936	[f]0	38.4 (1.1)	12.9 (0.37)

Note: Multiply cfs by 0.02832 to convert to m^3/s (cubic metres per second).

[a]Maximum daily.

[b]1955–70.

[c]Minimum daily.

[d]Caused by construction operations upstream.

[e]Greatest known since at least 1880.

[f]No flow at times.

[g]Feb. 3–5, 12, 14, 16–19, 1937; caused by unusual regulation during repair of dam at Grand Forks.

[h]Aug. 28, Sept. 14–Oct. 1, Oct. 7–12, 1956.

[i]At times in 1951–52, 1954–56, 1963–64.

[j]11 years (1961–72) regulated; mean, 2,362 cfs, 58 years (1903–61) unregulated.

[k]5 years (1967–72) regulated; mean, 195 cfs, 44 years (1923–67) unregulated.

Location of selected stream-gaging stations in the Midcontinent region described in table on page 10.

Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF MARCH 1975

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Feb. 1975	End of Mar. 1975	End of Mar. 1974	Average for end of Mar.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	49	44	75	62	223,400 (a)
QUEBEC					
Gouin (P)	58	53	56	43	6,954,000 ac-ft
Allard (P)	34	23	57	29	280,600 ac-ft
MAINE					
Seven reservoir systems (MP)	35	32	61	33	178,489 mcf
NEW HAMPSHIRE					
Lake Winnipesaukee (PR)	42	67	76	62	7,200 mcf
Lake Francis (FPR)	28	19	36	19	4,326 mcf
First Connecticut Lake (P)	22	5	23	14	3,330 mcf
VERMONT					
Somerset (P)	63	62	63	50	2,500 mcf
Harriman (P)	26	32	52	32	5,060 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	75	82	86	76	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	39	52	57	46	34,270 mcf
Indian Lake (FMP)	51	49	43	47	4,500 mcf
New York City reservoir system (MW)	92	99	99	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	101	101	100	89	27,730 mg
PENNSYLVANIA					
Wallenpaupack (P)	68	66	54	64	6,875 mcf
Pymatuning (FMR)	90	98	96	93	8,191 mcf
MARYLAND					
Baltimore municipal system (M)	96	100	97	92	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	94	103	90	90	12,580 mcf
High Rock Lake (P)	70	100	62	83	10,230 mcf
Narrows (Badin Lake) (P)	95	98	97	101	5,616 mcf
SOUTH CAROLINA					
Lake Murray (P)	87	93	84	76	70,300 mcf
Lakes Marion and Moultrie (P)	93	93	83	79	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	79	82	73	71	75,360 mcf
GEORGIA					
Burton (PR)	82	90	92	83	104,000 ac-ft
Lake Sidney Lanier (FMPR)	63	68	63	57	1,686,000 ac-ft
Sinclair (MPR)	100	97	87	90	214,000 ac-ft
ALABAMA					
Lake Martin (P)	96	100	81	89	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	46	79	61	50	1,156,000 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	51	84	66	55	1,452,000 cfsd
Douglas Lake (FPR)	24	73	42	42	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	56	84	62	63	512,200 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	61	88	64	63	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	38	30	36	24	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	17	8	18	25	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	23	20	24	19	1,640,000 ac-ft

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Feb. 1975	End of Mar. 1975	End of Mar. 1974	Average for end of Mar.	Normal maximum
	Percent of normal maximum				
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	83	83	83	.....	22,640,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	77	82	81	76	1,948,000 ac-ft
OKLAHOMA					
Keystone (FPR)	117	106	150	108	661,000 ac-ft
Lake O' The Cherokees (FPR)	108	105	111	86	1,492,000 ac-ft
Tenkiller Ferry (FPR)	110	108	112	88	628,200 ac-ft
Lake Altus (FIMR)	53	61	54	52	134,500 ac-ft
Eufaula (FPR)	117	98	108	82	2,378,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	104	103	102	88	2,722,000 ac-ft
TEXAS					
Possum Kingdom (IMPRW)	94	89	80	97	569,400 ac-ft
Buchanan (IMPW)	97	98	82	77	955,200 ac-ft
Bridgeport (IMW)	65	67	52	43	386,400 ac-ft
Eagle Mountain (IMW)	99	98	93	85	190,300 ac-ft
Medina Lake (I)	100	100	98	49	254,000 ac-ft
Lake Travis (FIMPRW)	100	100	100	78	1,144,000 ac-ft
Lake Kemp (IMW)	49	49	60	89	268,000 ac-ft
THE WEST					
ALBERTA					
Spray (P)	.....	.....	.....	21	210,000 ac-ft
Lake Minnewanka (P)	.....	.....	.....	33	199,700 ac-ft
St. Mary (I)	.....	.....	71	68	320,800 ac-ft
WASHINGTON					
Franklin D. Roosevelt Lake (IP)	83	31	37	47	5,232,000 ac-ft
Lake Chelan (PR)	22	8	23	31	676,100 ac-ft
IDAHO--WYOMING					
Upper Snake River (7 reservoirs) (IMP)	73	71	67	77	4,282,000 ac-ft
WYOMING					
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	64	66	71	45	3,056,200 ac-ft
Buffalo Bill (IP)	62	60	41	60	421,300 ac-ft
Boysen (FIP)	69	68	76	62	802,000 ac-ft
Keyhole (F)	69	71	84	40	199,900 ac-ft
COLORADO					
John Martin (FIR)	2	2	9	21	364,400 ac-ft
Colorado–Big Thompson project (I)	69	69	82	55	722,600 ac-ft
Taylor Park (IR)	47	47	60	57	106,200 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	69	69	71	.....	31,276,500 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	77	78	77	58	1,421,000 ac-ft
CALIFORNIA					
Hetch Hetchy (MP)	22	17	45	27	360,400 ac-ft
Lake Almanor (P)	81	87	102	50	1,036,000 ac-ft
Shasta Lake (FIPR)	82	91	96	84	4,377,000 ac-ft
Millerton Lake (FI)	61	65	90	63	503,200 ac-ft
Pine Flat (FI)	55	58	75	53	1,014,000 ac-ft
Isabella (FIR)	50	38	40	24	551,800 ac-ft
Folsom (FIP)	62	72	77	61	1,000,000 ac-ft
Lake Berryessa (FIMW)	96	102	102	89	1,600,000 ac-ft
Clair Engle Lake (Lewiston) (P)	79	88	97	88	2,438,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	69	75	84	56	744,600 ac-ft
NEVADA					
Rye Patch (I)	64	84	97	.....	157,200 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	77	76	75	63	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	23	22	50	19	1,093,000 ac-ft
Salt and Verde River system (IMPR)	53	60	73	47	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	37	38	71	77	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	20	19	34	28	2,539,000 ac-ft

[a]Thousands of kilowatt-hours

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 metre 1 mile = 1.609 kilometres
1 acre = 0.4047 hectare = 4,047 square metres
1 square mile (sq mi) = 259 hectares = 2.59 square kilometres (sq km)
1 acre-foot (ac-ft) = 1,233 cubic metres
1 million cubic feet (mcf) = 28,320 cubic metres
1 cubic foot per second (cfs) = 0.02832 cubic metres per second = 1.699 cubic metres per minute
1 second-foot-day (cfsd) = 2,447 cubic metres per day
1 million gallons (mg) = 3,785 cubic metres = 3.785 million litres
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic metres per minute = 3,785 cubic metres per day